

**NATURAL RESOURCE CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

FOREST STAND IMPROVEMENT

(Acre)
Code 666

DEFINITIONS

A practice used to manipulate species composition and stocking in a forest stand by cutting or killing selected trees and understory vegetation.

PURPOSE

This practice may be applied in a conservation management system as a component to address one or more of the following:

1. To improve or sustain timber production.
2. Improve understory forage production, aesthetics, wildlife habitat, recreation and hydrologic conditions.
3. To harvest forest products.
4. To initiate forest stand regeneration.
5. To achieve a combination of purposes.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where vegetation hinders development and stocking of preferred tree and understory species or where some or all of the stand will be cut or killed for intended purposes.

CRITERIA

Preferred tree and understory species will be identified and retained to achieve the intended purpose.

Spacing, density and amounts of preferred trees and understory species to be retained will follow established guidelines for the intended purposes. These guidelines will include stocking in terms of basal area, spacing, of trees per acre by species and size class distribution.

The direction of tree fall and the timing of tree cutting for harvesting shall facilitate efficient and safe tree removal and protect riparian zones, unique areas and structures.

Any slash, debris and vegetative material left on the site after treatment will be left in a condition that will not present an unacceptable fire or pest

hazard or interfere with the intended purpose.

Soil erosion, displacement and compaction, hydrologic impact and damage to remaining vegetation will not exceed acceptable levels.

The extent, size of treatment area or the intensity of the practice will not exceed acceptable levels for the intended purpose and cumulative ecosystem effects.

Comply with applicable laws and regulations, including the Best Management Practices (BMPs) for Louisiana.

CONSIDERATIONS

Proper timing of treatment and retaining dead or dying trees will minimize impacts on nesting wildlife.

Wildlife food and cover can be retained by minimal modifications to composition and spacing regardless of the purpose for the treatment(s). (See Wildlife Upland Habitat Management, Code 645, & Wildlife Wetland Habitat Management, Code 644).

Harvesting is an integral part of forest management. If executed properly, it is only a temporary disturbance to the forest environment. Harvesting operations should be planned and conducted to minimize soil compaction, erosion and sedimentation.

PLANS AND SPECIFICATIONS

Plans and specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

Plans and specifications will address targeted species that are to be cut, killed, or retained for intended purpose, soils, methods of application, and site protection from degradation.

I. Timber Stand Maintenance (Release)

Methods of Removal

A. Chemical

1. Chemical application over the top has become the most widely used method of release in recent years.
2. Injection
3. Basal spray
4. Hack and squirt

Success in applying a forestry herbicide depends on several critical factors.

- a. Species to be controlled
- b. Soils
- c. Environmental impact
- d. Herbicide selection
- e. Rates

Chemicals used for this practice must be labeled for forestry use and these labels must be followed.

B. Pre-Commercial Thin

This practice should be applied to overstocked young stands up to about 3 inches DBH.

Methods of Removal:

Trees may be removed by one or more of the following methods:

1. Rotary Mower

Trees are generally less than one-half inch DBH, mow strips 8-10 feet wide leaving remaining strips of 1-3 feet.

These strips may be left or they may be cross mowed or cross checked. Remaining clumps should be 1-3 feet wide.

2. Rolling Chopper, Disk or Bulldozer

Seedling to small sapling size trees may be chopped, disced or pushed down in strips 8 feet apart. Remaining strips should be 1-3 feet wide.

3. Hand Tools Seedlings or saplings may be thinned by machete, axe, brush hook or gas engine circular saw.

II. Harvesting

A. Intermediate Cutting

Selection of Trees

Selection of trees to cut and leave should be based on:

1. Management objectives
2. Adaptability of species to soil
3. Form and vigor of individual trees

Trees should be left or marked on their own individual merits. Intermediate cuttings will be based on consideration of the quality and needs of the individual tree in comparison with those of surrounding trees.

The following are guidelines to use when making intermediate cuttings:

1. Favor trees adapted to the site
2. Remove merchantable suppressed trees
3. Remove high risk and diseased trees
4. Remove forked, short bole trees
5. Remove crooked and low vigor trees
6. Space desirable trees to allow room for growth and development

Spacing

Intermediate cuttings should provide sufficient space for growth of the desirable trees for a given number of years. In pine stands the $D + X$ method for thinning is a good rule to use. The variety of species, varying growth rates, differences in vigor and tolerances of each species in mixed hardwood stands would make this impracticable. $D + X$ is the familiar way to express the growing space required by a tree for normal growth over a given number of years. "D" represents the DBH of a tree and "X" is an added constant to allow normal growing space to a leave tree. In most cases "X" will be 6 for southern pine. The DBH of a tree in inches is added to the constant "6" and the total is the average distance in feet that trees of this size should be spaced.

Example

$D + 6$ spacing of a 10-inch tree would be $10 + 6$ or 16 feet. In application of this method, trees should be considered in groups of three or more arranged in compact geometric figures with the outside trees spaced approximately $D + 6$ feet apart.

Cutting Cycle A cutting cycle is the length of

time between cuts in the same area. This time varies with species, stocking, and site index. For well-stocked vigorous stands the following table will serve as a guide for determining cutting cycles.

Site Index	50	60	70	80	90	100	110	120
	PINE							
Cutting Cycle (years)	9	8	7	6	5	5	5	
	SWEETGUM AND MIXED HARDWOOD							
Cutting Cycle (years)	--	--	14	12	10	9	8	
	COTTONWOOD							
Cutting Cycle (years)	--	--	--	--	7	6	5	4

Harvest Cut Harvest trees as used in this practice refers to merchantable trees harvested in addition to intermediate cuttings. These are trees that are considered to be financially mature because of condition: site, species, cutting cycle or the management objectives. The number of "harvest trees" to remove or the size of the harvest area will depend on site index, species and cutting cycle and management objectives. The harvest area can vary in size depending on the owner's objectives and desires. The harvest area can be regenerated artificially or naturally. Artificial regeneration can be accomplished by planting seedlings or seed. (See Tree/Shrub Establishment, Code 612).

A normal rule of thumb for intermediate cutting in stands is to thin to a basal area of 80 square feet per acre. This will vary on those stands that will be intensively managed. Adjustments should be made to compensate for natural mortality due to fire, insects, disease, natural disasters and stand composition. Several options are available to landowners when regenerating southern pine and hardwood. The regeneration method used will usually depend on the management system either uneven-age or even-age.

HARDWOOD

A. Uneven-Age System

This management system may be accomplished by using the following methods:

1. Diameter Limit Method

Trees are selected for harvest by cutting to a diameter limit (stump). This is the least desirable method.

2. Single Tree Method

This method is often recommended for landowners with small tracts. If done in the proper manner, there is temporary disturbance to the forest environment. This is not an effective method of regenerating desirable shade-intolerant species because openings created by harvesting are too small to allow sufficient sunlight.

B. Even-Age System

Five choices exist for management of hardwoods.

1. Artificial

(See Tree/Shrub Establishment, Code 612)

- seedlings
- seed

2. Natural

This method is relatively easy and inexpensive when compared to artificial in regenerating hardwood in an existing stand. Regeneration is accomplished from seed, advanced regeneration and stump and root spouts.

3. Silvicultural Clearcut

This method is very efficient in regenerating hardwood stands. There is a very important difference between a commercial and silvicultural clearcut. A silvicultural clearcut could be described as a commercial clearcut followed by site preparation. Site preparation of this type would consist of felling or injecting all culls and unmerchantable material. No desirable species would be injected but they would be felled. Regeneration would be accomplished from spouts in this method. Advanced regeneration would have to be present for success.

4. Group Selection

This method is recommended when impact on wildlife and other resources should be decreased.

5. Shelterwood

This method has been recommended as one that may work in the south when the objective is

to increase the oak component in the future stand. Oaks must be present in the understory as advanced regeneration (1 inch diameter at the root collar and 4 ½ feet tall) prior to the final cut.

PINE

A. Uneven-Age System

1. Selection Method

This method is the removal of mature timber, usually the oldest or largest trees, either as single scattered individuals or in small groups at relatively short intervals. This method would be repeated indefinitely, by means of which the continuous establishment of regeneration is encouraged and an uneven-age stand is maintained.

B. Even-Age System

1) Clearcut method

Removal of the entire stand in one cutting with regeneration obtained artificially or by natural seeding from adjacent stands or from trees cut in the harvesting operation.

2) Seed-Tree method

Removal of the mature timber in one cutting, except for a small number of seed trees left spaced over the area or in small groups.

3) Shelterwood method

Removal of the mature timber in a series of cuttings, which extend over a relatively short portion of the rotation, where the establishment of essentially even-age regeneration under the partial shelter of seed trees is encouraged.

PINE NATURAL REGENERATION

Method	Seed Source Trees Per Acre	Advantages	Disadvantages																					
Seed Tree	<table><tr><th>DBH</th><th>Loblolly</th><th>Shortleaf</th></tr><tr><td>10"</td><td>12</td><td>20</td></tr><tr><td>12"</td><td>10</td><td>14</td></tr><tr><td>14"</td><td>8</td><td>12</td></tr><tr><td>16"</td><td>4</td><td>12</td></tr></table>	DBH	Loblolly	Shortleaf	10"	12	20	12"	10	14	14"	8	12	16"	4	12	1) Possible high volume first cut. 2) Less expensive than planting 3) Seed source left in place. 4) Aesthetically pleasing	1) Seedlings are not genetically improved. 2) Remaining volume may not be sufficient for harvest. 3) High risk to seed trees form lightning, wind, <i>etc.</i> 4) Hard to control seedling density.						
DBH	Loblolly	Shortleaf																						
10"	12	20																						
12"	10	14																						
14"	8	12																						
16"	4	12																						
Shelterwood	<table><tr><th>DBH</th><th>Upper^a</th><th>Lower</th></tr><tr><td>10"</td><td>110</td><td>55</td></tr><tr><td>12"</td><td>75</td><td>40</td></tr><tr><td>14"</td><td>55</td><td>30</td></tr><tr><td>16"</td><td>45</td><td>20</td></tr><tr><td>18"</td><td>35</td><td>15</td></tr><tr><td>20"</td><td>30</td><td>15</td></tr></table> ^a Trees /acre in stands with basal area of 30 - 60 sq. ft.	DBH	Upper ^a	Lower	10"	110	55	12"	75	40	14"	55	30	16"	45	20	18"	35	15	20"	30	15	1) Remaining trees help suppress competition and continuous growth. 2) Less expensive than planting. 3) Aesthetically pleasing 4) Offer more options.	1) Seedling are not genetically improved. 2) Cannot control seedling density. 3) Remaining trees may be subject to logging damage. 4) Less volume in first cutting.
DBH	Upper ^a	Lower																						
10"	110	55																						
12"	75	40																						
14"	55	30																						
16"	45	20																						
18"	35	15																						
20"	30	15																						
Clearcutting	The trees bordering the clearcut serve as a seed source. Size - Maximum width is 400 feet. Location - oriented perpendicular to the prevailing wind.	1) Larger timber sale. 2) All harvesting done at the same time. 3) Marking and supervision of harvest in minimal.	1) Seedlings are not genetically improved. 2) Cannot control seedling density. 3) The only remedy for failure in planting. 4) Not aesthetically pleasing.																					

OPERATION AND MAINTENANCE

Operation and maintenance are not applicable for this practice.